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# ***Guide for Cutting Red Spruce***

U. S. DEPARTMENT OF AGRICULTURE  
FOREST SERVICE

AIS-6





Logging red spruce, White Mountain National Forest, N. H.

F-361418



# GUIDE FOR CUTTING RED SPRUCE

Prepared by Northeastern Forest Experiment Station, Forest Service <sup>1</sup>

## *Description of the Forest*

The red spruce of the Northeast sometimes occurs in pure stands, but more often is found with beech, birch, and maple. Balsam fir is almost always present. In the true spruce type, spruce and fir make up 50 percent or more of the merchantable volume (approximately 50 percent of the number of trees 6 inches in diameter breast high <sup>2</sup> and larger). Spruce is used primarily for pulp but also for

lumber. Large, clear logs are valuable for aircraft stock.

For stands containing much less than 50 percent spruce and fir, instructions for New England northern hardwood forests may be more applicable.

## *Estimate the Stand* <sup>3</sup>

If you plan to sell standing trees for the buyer to cut, you will need to make a complete inventory of the salable trees on the tract. If you plan to cut your own timber and sell logs, measure

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<sup>1</sup> 614 Bankers Securities Building, Philadelphia 7, Pa.

<sup>2</sup> Diameter breast high is at 4½ feet above average ground level. Stump diameter is an inch or two larger.

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<sup>3</sup> For more detailed information obtain a copy of U. S. Department of Agriculture Farmers' Bulletin 1210, *Measuring and Marketing Farm Timber*.



a sample, perhaps 10 or 20 percent of the trees of cutting size, to get a fair idea of the volume and quality of timber available. Scale the logs after cutting to correct this rough estimate.

*Knowing what you have to sell, you are in a position to secure a fair price for it.*

In making a complete inventory, tally all spruce of 8-inch diameter and larger and all balsam fir 6 inches in diameter and larger, designating them as best fitted for saw timber, pulpwood, or perhaps just fuel wood, by using a form similar to that shown on pages 8 and 9. In general, trees 16 inches and larger in diameter should be used for saw timber. Do not cut the trees below 16 inches unless the stand will be benefited by a thinning.

The timber estimating form, just referred to, is merely a guide. Figures

from a  $\frac{1}{4}$ -acre tally have been inserted to illustrate its use. The headings dealing with products might be changed, where appropriate, to include poles or veneer logs, or to exclude items not marketable.<sup>4</sup>

### *Plan to Cut Not Over 50 Percent of the Stand*

A good general rule to follow is that *no more* than 50 percent of the merchantable volume should be harvested for either sawlogs or pulpwood in a single cutting.

Remember, however, that spruce

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<sup>4</sup> Local markets determine the kind and value of trees suitable for saw or veneer logs, pulpwood, chemical wood, or fuel wood. The local market and value of each product should be ascertained. Usually the best values are obtained for veneer or sawlogs. Smaller or less valuable trees and tops may be utilized for pulpwood or chemical wood if not needed for future saw timber; fuel wood is usually made from tops or trees not suitable for other products.



and fir are *shallow rooted* and subject to *wind throw*. Only on well-drained soils can a 50-percent removal be undertaken with safety. *In moister soils and in stands containing a high proportion of fir, cut only 30 percent or, at most, no more than 40 percent.* Some individual acres may be cut heavier and others lighter, but the average cut should be realized on any 3-acre patch.

The 50-percent cut, if feasible, will take most of the merchantable saw timber and, if there is a ready market for fuel wood, the low-grade competing hardwoods should be included.

The volume removed will be largely restored by growth within 12 to 15 years, when a second cut yielding timber of even higher value should be possible. A cut will be necessary in

less than 20 years to avoid wasting the fir, which is subject to heart rot from an early age.

*Mark the trees to be cut.*<sup>5</sup> Select the largest first, but take out also any limby and rough trees not needed for seed production or to protect the reserve stand from wind along stand margins. All cutting should leave clean-boled, thrifty spruce well distributed over the area. In areas to be cut primarily for saw timber, *thinning* spruce for pulpwood down to trees 8 inches in diameter, and fir down to trees 6 inches in diameter, is good forestry.

The figures used on the sample

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<sup>5</sup> Your State forester, extension forester, local Forest Service officer, foresters of other Government agencies, or private consulting foresters can help you estimate, mark, manage, and market your trees. Seek their counsel before cutting.



timber estimating form, which are from an actual tract, show 2,720 board feet of softwood saw timber, in this case all spruce, 5,012 feet of hardwood saw timber, mostly yellow birch and maple, 8 cords of pulpwood-size timber and 8 cords of fuel wood from poor grade hardwoods, per acre. A proper cut would take about half the spruce saw timber, a third of the pulpwood, all the hardwood saw timber (which is fully mature), and the fuel wood if possible. This would be about 6,300 board feet of saw timber and 2.7 cords of pulpwood per acre—equivalent to a little more than 50 percent of the merchantable volume in this case.

Mark the large, clean-boled spruce for sawlogs. (They are often marketed for pulpwood at a loss.) Also yellow birch or sugar maple logs of veneer

quality should be carefully noted. Logs for aircraft veneer often bring much higher prices than sawlogs.

Trees of undesirable species or condition should be removed in a cordwood operation, if markets are available. As a last resort, such trees should be girdled when they suppress desirable reserved trees.

Some small areas may have to be cut clear, as, for example, pure balsam fir stands in wet sites. Try to keep clear-cut areas down to one-half acre in size or less.

## *Thin Young Stands*

*Judicious thinning* in dense, young, second-growth stands will materially shorten the period necessary to bring such stands to pulpwood size and



greatly increase final yields. Thinning should be undertaken in stands under 40 years old, but large enough to yield salable material. The best procedure is to remove from 20 to 25 percent of the stand at 10-year intervals. Take out balsam fir in preference to spruce, and try to release a good thrifty spruce crop tree in doing so.

Try to rid the stand of misshapen, limby, and injured trees. In no case should less than 250 trees between 3 and 6 inches in diameter be left. This is the minimum number to prevent windfall and snow damage.

## **Small Trees**

If the merchantable volume is made up of large logs, rather than many small ones, it will cost much less per thousand board feet to cut and haul.

This will make for greater profit, if you do your own logging; it should result in a better price, if you sell stumpage, because the operator can log with less expense.

*Twice as many man-hours are required to cut or to skid 1,000 board feet of logs from 6-inch as from 13-inch trees, and almost three times as many man-hours are required to mill them.*

The grade value of lumber from 13-inch trees will be 50 percent greater than that of lumber from 6-inch trees.

*A cordwood cutter can produce 2 cords from 12-inch trees in the time it takes to cut 1 cord from 4-inch trees.*

## **Do Not Cut—**

If the better species are scattered and there is less than 2,500 board feet per acre in saw timber or 5 cords in



pulpwood; in such stands the growing stock needs building up. This does not mean, however, that dense, young stands should not be thinned.

## SCALING LOGS

Measure the volume of logs cut by using one of the following log rules. The Doyle rule is most commonly used in the East, but it benefits the buyer by giving too low a volume for

logs under 28 inches in diameter. The Scribner rule is more accurate, but the International rule is the most accurate and fairest. It allows a  $\frac{1}{4}$ -inch saw kerf and gives the lumber content of the log resulting from careful sawing by good methods. If another rule is proposed, check it against the values given on page 7 to see how much it varies from the International rule.



# International (1/4-inch) Rule

Diameter of log at small end, inside bark (inches)	Scale in board feet for log length of—				
	8 feet	10 feet	12 feet	14 feet	16 feet
8.....	15	20	25	35	40
10.....	30	35	45	55	65
12.....	45	55	70	85	95
14.....	65	80	100	115	135
16.....	85	110	130	155	180
18.....	110	140	170	200	230
20.....	135	175	210	250	290
22.....	170	215	260	305	355
24.....	205	255	310	370	425

## Doyle Rule

8.....	8	10	12	14	16
10.....	18	23	27	32	36
12.....	32	40	48	56	64
14.....	50	62	75	88	100
16.....	72	90	108	126	144
18.....	98	122	147	171	196
20.....	128	160	192	224	256
22.....	162	202	243	283	324
24.....	200	250	300	350	400

## Scribner Rule

8.....	.....	.....	25	28	32
10.....	.....	.....	40	45	50
12.....	.....	.....	60	70	80
14.....	.....	.....	85	100	115
16.....	.....	.....	120	140	160
18.....	.....	.....	160	190	213
20.....	.....	.....	210	245	280
22.....	.....	.....	250	290	334
24.....	.....	.....	300	350	404



(1) Diameter class <sup>2</sup> (inches)	Softwoods								
	(2) Board feet per tree		(3) Cords per tree <sup>3</sup>	(4) Number of trees			(5) Volume, board feet	(6) Volume, cords	
	Spruce and fir	All others		Saw timber	Pulp- wood	Fuel wood		Pulp- wood	Fuel wood
6.....			0.02		2			0.04	
7.....			.05		4			.20	
8.....			.07		3			.21	
9.....			.10		2			.20	
10.....	40	70	.13		2			.26	
11.....	65	91	.15						
12.....	90	112	.18		3			.44	
13.....	110	141	.21		3			.63	
14.....	135	170	.26	1			135		
15.....	160	207	.31	1			160		
16.....	180	244	.38	1			180		
17.....	205	282	.44	1			205		
18.....	225	320	.53						
19.....	250	370	.61						
20.....	265	420	.70						
22.....	310	500	.78						
24.....	360	590							
26.....	405	690							
28.....		800							
30.....		970							
Total (1/4-acre).....				4	19		680	1.98	
Total per acre.....				16	76		2,720	7.92	

<sup>1</sup> Tally in columns 4 and 9 the number of trees in each diameter class. Simple multiplication will then give the board foot and cord volumes for each class. Where values for saw timber and cordwood overlap, distinguish in your tally between timber and cordwood trees.

<sup>2</sup> Diameter of tree measured at breast height (4½ feet). If you choose to group your trees by 2-inch classes, as 8,



# Estimating Form <sup>1</sup>

Hardwoods							
(7) Board feet per tree	(8) Cords per tree <sup>3</sup>	(9) Number of trees			(10) Volume, board feet	(11) Volume, cords	
		Saw timber	Pulpwood	Fuel wood		Pulpwood	Fuel wood
.....	0.10	.....	.....	1	.....	.....	0.10
.....	.15	.....	.....	1	.....	.....	.15
.....	.20	.....	.....	1	.....	.....	.20
.....	.25	.....	.....	.....	.....	.....	.....
42	.30	.....	.....	.....	.....	.....	.....
61	.35	.....	.....	1	.....	.....	.35
75	.40	.....	.....	.....	.....	.....	.....
95	.48	.....	.....	.....	.....	.....	.....
114	.56	.....	.....	.....	.....	.....	.....
137	.65	.....	.....	.....	.....	.....	.....
160	.75	.....	.....	.....	.....	.....	.....
192	.85	1	.....	.....	192	.....	.....
224	.95	.....	.....	.....	.....	.....	.....
255	1.07	.....	.....	.....	.....	.....	.....
286	1.18	1	.....	1	286	.....	1.18
354	.....	1	.....	.....	354	.....	.....
421	.....	1	.....	.....	421	.....	.....
500	.....	.....	.....	.....	.....	.....	.....
600	.....	.....	.....	.....	.....	.....	.....
700	.....	.....	.....	.....	.....	.....	.....
.....	.....	4	.....	5	1,253	.....	1.98
.....	.....	16	.....	20	5,012	.....	7.92

10, 12, etc., remember that in classifying, diameters greater than the odd inch go in the higher class. (Example: A tree 11.1 or 13.0 inches is in the 12-inch class; one from 9.1 to 11.0 inches is in the 10-inch class.)

<sup>3</sup> This is for standard 48-inch cords. For 52-inch cords, decrease each item by 7.5 percent. For 60-inch cords, decrease each item by 20 percent.



